

[0019]

What is claimed is:

1. A method of stimulating a water sensitive coal bed seam containing methane gas penetrated by a well bore to enhance the production of methane gas therefrom comprising the steps of:

(a) contacting and heating the coal bed seam with hot nitrogen gas so that the coal bed in the seam shrinks and forms methane gas flow passages therein; and

(b) producing the methane gas through the flow passages.

2. The method of claim 1 wherein the coal bed seam is under saturated with low pressure methane gas.

3. The method of claim 1 wherein the hot nitrogen gas has a temperature in the range of from about the in situ ambient temperature to about 350°F.

4. The method of claim 1 wherein the coal bed seam is contacted and heated by pumping the hot nitrogen gas into the coal bed seam at a low rate and pressure sufficient to heat and shrink the coal bed thereby forming the methane flow passages therein.

5. The method of claim 1 wherein the nitrogen gas is pumped from the surface into the coal bed seam.

6. The method of claim 1 wherein the nitrogen gas is heated in the well bore by a heater disposed therein.

7. The method of claim 5 wherein the heater is selected from the group consisting of electric heaters, electric heat exchangers and friction heat exchangers.

8. The method of claim 1 wherein the well bore includes casing and perforations extending into the coal bed seam.

9. The method of claim 1 wherein the heater is positioned in the well bore adjacent to or near the coal bed seam.

10. The method of claim 1 wherein the nitrogen gas is pumped through coiled tubing disposed in the well bore.

11. The method of claim 10 wherein the heater is connected to the coiled tubing.

12. The method of claim 10 wherein the coiled tubing includes packers above and below the coal bed seam.

13. A method of stimulating a water sensitive coal bed seam penetrated by a well bore that is under saturated with low pressure methane gas comprising the steps of:

(a) providing a source of nitrogen gas on the surface and pumping the nitrogen gas at a relatively low rate by way of a heater disposed in the well bore into the coal bed seam;

(b) heating the nitrogen gas by the heater to a temperature in the range of from about the in situ ambient temperature to about 350°F so that the nitrogen gas heats the coal bed and causes it to shrink and form enlarged methane gas flow passages therein; and

(c) producing methane gas from the coal bed by way of the flow passages.

14. The method of claim 13 wherein the heater is selected from the group consisting of electric heaters, electric heat exchangers and friction heat exchangers.

15. The method of claim 13 wherein the well bore includes casing and perforations extending into the coal bed seam.

16. The method of claim 13 wherein the heater is positioned in the well bore adjacent to or near the coal bed seam.

17. The method of claim 13 wherein the nitrogen gas is pumped through coiled tubing disposed in the well bore.

18. The method of claim 13 wherein the heater is connected to the coiled tubing.

19. The method of claim 13 wherein the coiled tubing includes packers above and below the methane gas seam.

20. The method of claim 13 wherein the coal bed seam is one of a plurality of thin coal bed seams penetrated by the well bore.